

## REDUCTION OF SEVERE BEHAVIOR PROBLEMS IN THE COMMUNITY USING A MULTICOMPONENT TREATMENT APPROACH

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Problem behavior often prevents community integration of people with developmental disabilities. Therefore, we evaluated a multicomponent approach for remediating problem behavior in public community settings (specifically, supermarkets). We selected treatments based on hypotheses about the variables controlling the problem behavior (hypothesis-driven model). The multicomponent intervention included choice making, embedding, functional communication training, building tolerance for delay of reinforcement, and presenting discriminative stimuli for nonproblem behavior. Treatment progress was monitored using measures of latency and task completion rather than traditional measures of frequency and time sampling. Results showed substantial increases in task completion and duration of time spent in supermarkets without problem behavior. Outcomes were socially validated by group-home staff and cashiers. We discuss how the intervention approach taken can resolve some of the issues involved in assessing, measuring, and treating problem behavior in the community.

**DESCRIPTORS:** community-based treatment, functional analysis, aggression, problem behavior, developmental disabilities

A dominant theme in the literature on developmental disabilities has been the importance of fully integrating people with a variety of handicaps into the community (Kennedy & Haring, 1992; Meyer, Peck, & Brown, 1991; Scotti, Evans, Meyer, & Walker, 1991). Community integration has included a focus on the school (Sailor et al., 1989), the workplace (Rusch, 1990), and recreation and leisure (Wehman & Schleien, 1981). Unfortunately, several decades of research suggest that the presence of severe problem behavior may seriously jeopardize the successful participation of people with

developmental disabilities in the community (Eyman, Borthwick, & Miller, 1981; Nihira & Nihira, 1975; Windle, Stewart, & Brown, 1961), often leading to their isolation or even institutionalization. This fact argues for remediation of problem behavior as one facet of an overall strategy to facilitate integration.

A common community activity for people without disabilities involves shopping in a public place such as a supermarket (Clark et al., 1977). Consistent with the emphasis on integration, the literature has delineated the procedures needed to establish shopping skills in people with disabilities (Aeschleman & Schladenhauffen, 1984; Gaule, Nietupski, & Certo, 1985; Matson, 1981; McDonnell, 1987; Nietupski, Welch, & Wacker, 1983; Wheeler, Ford, Nietupski, Loomis, & Brown, 1980). Although all studies reported successful outcomes and enhanced community participation, none of the studies involved individuals who exhibited severe problem behavior. One purpose of our study, therefore, was to identify procedures that would enable individuals who exhibit severe problem behavior to shop successfully in a supermarket without endangering themselves or others.

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This investigation was supported in part by Cooperative Agreement G0087C0234 from the U.S. Department of Education, "A Rehabilitation Research and Training Center on Community-Referenced Technologies for Nonaversive Behavior Management." Portions of this paper were presented at the annual meeting of the Association for Behavior Analysis, Atlanta, May, 1991.

We thank Martin Hamburg, Executive Director, Developmental Disabilities Institute, for his generous support and Kim Aldrich, Dawn Cuglietto, Rich Lombardo, and Joe Milne for help with data collection. We also thank Sarah Robinson and Christopher E. Smith for their helpful criticisms.

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Because problem behavior that occurs in complex community settings is often controlled by multiple factors, successful remediation will almost certainly involve the use of multiple treatments (Carr, Robinson, Taylor, & Carlson, 1990; Haring & Kennedy, 1990; Horner et al., 1990; Iwata, Vollmer, & Zarcone, 1990; Wacker & Steege, in press). Therefore, a second purpose of our study was to describe and evaluate a logically derived multicomponent intervention.

Traditionally, interventions have been evaluated using measures of frequency and time sampling. These measures are especially appropriate in home and school settings where parents or professional staff monitor the problems. In these settings, there is an understanding that problem behavior is likely to occur in baseline and must be tolerated, at least in the short run, for purposes of assessment. No such tolerance exists in a public supermarket. Instead, even a relatively small number of instances of property destruction or aggression against other patrons results in expulsion from the store or police action. Also, caretakers who accompany individuals with disabilities to the store are embarrassed by public displays of problem behavior and are, therefore, not likely to agree to monitor progress using frequency or time-sampling measures. In light of these practical difficulties, it is desirable to have alternative measures for use in public settings. Accordingly, a third purpose of our study was to evaluate the utility of measures of latency to problem behavior and percentage of task completion as alternatives to measures of frequency and time sampling. The rationale for employing these measures was that, in the community, we are less concerned with rate or level of problem behavior and more concerned with whether an individual can complete a shopping task in a reasonable amount of time and can do so without engaging in problem behavior.

## METHOD

### *Subjects and Setting*

Subject selection was made on the basis of interviews with group-home staff members who

worked in a program serving people with developmental disabilities. The first 3 people who met all of the following criteria were selected for inclusion in the study: (a) a history of serious behavior problems displayed in community settings; (b) the problem behavior included any combination of aggression, property destruction, self-injurious behavior, and tantrums; and (c) the individual was currently excluded from participating in community activities because of past displays of problem behavior in the community. To initiate the hypothesis generation process, we also asked staff members why they thought particular individuals misbehaved. For each individual, staff members consistently hypothesized that problem behavior was a function of either escape from aversive stimuli or tangible reinforcement, depending on the situation.

The medical staff had diagnosed all 3 individuals as autistic. Mark was 18 years old; on the Stanford-Binet (L-M), he received a mental age score of 5 years, and his language age was determined to be 3.85 years on the Mecham Verbal Language Development Scale. Mark communicated in three- to seven-word sentences and initiated requests to make his basic needs known. Bob was 17 years old; his mental age was 3 years 10 months (Stanford-Binet) and his language age was 3.5 years (Communication Evaluation Chart). He communicated using single-word labels. Danny was 16 years old; his mental age was 2 years (Stanford-Binet) and his language age was 3.38 years (Mecham scale). He was echolalic but could use two- to five-word sentences to express basic needs. All 3 individuals could follow simple one-step verbal directions. A variety of interventions, including time-out, response cost, and token economies, had been used unsuccessfully in the past to manage problem behavior.

All sessions were carried out in four supermarkets normally used by the group-home staff in their shopping expeditions.

### *Procedure*

*Baseline and assessment.* Three to five sessions were conducted per week, half of the sessions in the morning and half in the afternoon. Sessions were distributed equally and randomly across the

Table 1  
Shopping Task Sequence

Step	Discriminative stimulus (cue)	Correct response
1. Enter store	Nonverbal: Exiting from parked car in supermarket lot Verbal: "Let's go shopping"	Walks toward entrance within 5 s and subsequently enters store
2. Get a shopping basket or cart	Nonverbal: Stack of baskets or row of carts in sight Verbal: "Get a basket, please"	Gets a basket or cart within 5 s
3. Get Item 1 (on shopping list)	Nonverbal: Standing in front of item Verbal: "Get _____, please"	Initiates search for item within 5 s and subsequently obtains item, placing it in basket or cart
4. Get Item 2	Same as above	Same as above
5. Get Item 3	Same as above	Same as above
6. Go to the checkout line	Nonverbal: All items present in basket or cart Verbal: "Go to the cashier, please"	Walks to checkout line within 5 s
7. Wait in line	Nonverbal: Standing behind last person in line Verbal: "We have to wait here"	Remains in line
8. Place items on counter	Nonverbal: Standing adjacent to counter Verbal: "Put the groceries on the counter, please"	Puts groceries on counter within 5 s
9. Hand money to cashier	Verbal: Cashier states total price Verbal: "Give the money to the cashier, please"	Gives money within 5 s
10. Wait for change	Nonverbal: Cashier holds out change Verbal: "Get the change, please"	Takes change within 5 s
11. Pick up bag of items	Nonverbal: Cashier places bag of items on counter Verbal: "Get the bag, please"	Picks up bag within 5 s
12. Exit and go to vehicle	Nonverbal: Has grocery bag in hand Verbal: "Let's go to the car"	Walks to exit within 5 s and proceeds to car in parking lot

four supermarkets. Three staff members from each of the three group homes were assigned to carry out sessions under the direct supervision of the second author. Staff members had 6 to 18 months of experience working in the group homes. Each session consisted of the 12-step shopping sequence shown in Table 1. This sequence was based on the task analysis outlined by Brown et al. (1978). The items purchased varied from session to session depending on the supply needs of the group homes. Staff members were asked to construct a list of items known to be preferred or not preferred by individual residents. The proportion of preferred and nonpreferred items was held constant over the course of the study. Staff members employed the general procedures that they typically used on shopping trips. Specifically, the discriminative stimulus for responding on each step consisted of a nonverbal

cue plus a verbal cue presented by the staff person (with the exception of Step 9, as noted). Consider Step 1 ("Enter store"). The nonverbal cue consisted of a specific natural stimulus, namely, exiting from the parked car in the supermarket lot. The accompanying verbal cue for this step was the sentence, "Let's go shopping." If the resident responded correctly to these cues within 5 s, the staff person provided positive feedback that was appropriate to the context (e.g., for Step 1, "O.K., Mark, we're on our way now"). If the resident did not respond or made an incorrect response (e.g., walked in the opposite direction from the store entrance), a sequence of consequences was used. First, the staff member provided corrective feedback and presented the verbal cue again (e.g., "No, you're going the wrong way. Let's go shopping"). If the resident failed to respond correctly, the staff member pro-

vided the verbal cue plus a gestural prompt (e.g., pointing to the store entrance). If the gestural prompt failed, the staff member presented the verbal cue plus a physical prompt (e.g., placing a hand on the back of the resident and gently guiding him towards the store entrance).

The session continued until all steps of the shopping sequence were completed or until the resident displayed either of two criterion levels of problem behavior. If either of the criterion levels were met, the session was terminated and the resident was escorted out of the store. Different criteria were used depending on whether the problem behavior was designated as intolerated or tolerated. Pilot observations had suggested that certain problem behaviors were less well tolerated than others by significant members of the community (i.e., cashiers, store managers, security police, and other customers). A single instance of such behavior evoked complaints from other people and, often, expulsion from the store. Therefore, a single instance of intolerated behavior was the criterion used for session termination. Intolerated problem behavior included (a) aggression or attempted aggression towards another person (hitting, punching, kicking, biting, grabbing, or shoving others; striking another person with an object; or attempting any of these behaviors but missing the victim because he or she successfully avoided the attack), (b) aggression against property (striking, throwing, or destroying an object or physical structure), and (c) more than 5 s of screaming accompanied by throwing oneself on the floor and flailing the arms and legs. Pilot observations had also suggested that certain problem behaviors were tolerated provided that they did not occur too often. Therefore, a different criterion was used for session termination in the case of tolerated problem behavior. Specifically, the session was terminated when any three instances of the following tolerated behaviors occurred within a session: (a) 5 s or less of screaming unaccompanied by other problem behavior, (b) self-injury (hitting self in face once with open hand), and (c) 2 to 5 s of stomping feet on the floor accompanied by loud vocalizations.

During baseline, an additional descriptive observational assessment was undertaken as an aid to

subsequent treatment planning. The purpose of this assessment was to collect information that could later be used to generate plausible hypotheses concerning the variables that maintained problem behavior. The second author and a research assistant compiled an anecdotal record of each episode of problem behavior that occurred (Table 2). Situations that evoked problem behavior less than three times across all baseline sessions were not considered in hypothesis generation. Each of the 18 problem situations listed in Table 2 for the 3 residents occurred many more than three times each in baseline and accounted for virtually all instances of observed problem episodes.

*Treatment.* Sessions were conducted once or twice each day at various times of the day in the same four supermarkets used in baseline. As in baseline, a session continued until the 12-step shopping sequence was completed or until the resident displayed either of the two criterion levels of problem behavior. The second author trained all participating staff members in the use of the treatment procedures.

Prior to implementing treatment procedures in the supermarket, staff members received five 20-min sessions of training in which the rationale for each procedure was explained and the procedure itself was modeled. Staff members were then required to demonstrate use of the procedure on one another, after which they received corrective or supportive feedback as appropriate. During the first supermarket session, the second author prompted each staff person on what to do as each problem situation in Table 2 arose. In subsequent sessions, the second author provided prompts only if the staff person failed to implement the required treatment within 5 s of the onset of the problem situation. Prompts were gradually faded for staff members after three, five, and eight treatment sessions for Mark, Bob, and Danny, respectively.

Each resident participated in a multicomponent treatment intervention consisting of five procedures: choice, embedding, functional communication training, building tolerance for delay of reinforcement, and presentation of discriminative stimuli for nonproblem behaviors.

Table 2  
Problem Situations, Hypotheses Regarding Variables  
Maintaining Problem Behavior, and Treatments Based on  
These Hypotheses

Mark	<p>1. Problem situation: After entering store, he turns around and runs toward exit. If he is escorted out the door, he is calm. If he is prevented from leaving, he screams, stomps feet, hits or punches staff person who prevents him from leaving. Hypothesis: Escape from store because store is associated with a variety of aversive shopping tasks. Treatment: Choice of initial activity.</p> <p>2. Problem situation: He is asked to get a nonpreferred item from shopping list (e.g., soap). Responds by shoving staff person and running away. Hypothesis: Escape from demand to get nonpreferred item. Treatment: Choice of alternative preferred activities. Embed demands.</p> <p>3. Problem situation: He asks for prohibited item (e.g., salty foods such as pretzels not allowed because of his high blood pressure) and is told he cannot have it. Responds by grabbing item and tearing it open. Aggresses against staff members who try to prevent access to item. Hypothesis: Tangible reinforcement in the form of prohibited item. Treatment: Choice of alternative reinforcers (e.g., pretzels low in salt content).</p> <p>4. Problem situation: He is standing in front of preferred item. Grabs item. Aggresses against staff members who try to prevent access to item. Hypothesis: Tangible reinforcement in the form of preferred item. Treatment: Functional communication. Tolerance for delayed reinforcement.</p> <p>5. Problem situation: He is asked to terminate an activity involving a preferred item (e.g., reading labels on boxes of pasta). He responds by screaming and aggressing against staff person while holding on to preferred item. Hypothesis: Tangible reinforcement in the form of preferred item. Treatment: Choice of alternative reinforcers (e.g., a different preferred item).</p> <p>6. Problem situation: While waiting in line behind other customers at checkout, he becomes aggressive to the customers and/or staff. Hypothesis: Escape from demand to wait in line. Treatment: Present discriminative stimuli for nonproblem behavior.</p>
Bob	<p>1. Problem situation: Same as 1 for Mark. If he is prevented from leaving, he screams, hits himself on head. Hypothesis and treatment: Same as 1 for Mark.</p> <p>2. Problem situation: Same as 2 for Mark. Responds by slamming cart on floor and aggressing against staff person.</p>

Table 2  
(Continued)

	<p>Hypothesis and treatment: Same as 2 for Mark.</p> <p>3. Problem situation, hypothesis, and treatment: Same as 4 for Mark.</p> <p>4. Problem situation: He is given a gestural prompt because he did not respond to a request to get a nonpreferred item. He screams, hits himself on head. Hypothesis: Escape from gestural prompt. Treatment: Choice of alternative preferred activities. Embed demands.</p> <p>5. Problem situation: He is given a physical prompt because he did not respond to a gestural prompt. He smashes item with fist. Hypothesis: Escape from physical prompt. Treatment: Choice of alternative preferred activities. Embed demands.</p> <p>6. Problem situation, hypothesis, and treatment: Same as 6 for Mark.</p>
Danny	<p>1. Problem situation: After entering store, he runs to checkout line and grabs items from other customers. If staff intercede to block the grabbing, he becomes aggressive. Hypothesis and treatment: Same as 4 for Mark.</p> <p>2. Problem situation, hypothesis, and treatment: Same as 2 for Mark.</p> <p>3. Problem situation: He is walking down an aisle and another customer passes him with a cart of groceries. He grabs the other customer's items. If staff members intercede to block the grabbing, he becomes aggressive. Hypothesis and treatment: Same as 4 for Mark.</p> <p>4. Problem situation: Same as 4 for Bob. He screams, hits himself on head, and aggresses against staff person. Hypothesis and treatment: Same as 4 for Bob.</p> <p>5. Problem situation, hypothesis, and treatment: Same as 6 for Mark.</p> <p>6. Problem situation: While waiting for the cashier to ring up the items, he grabs pens from cashier. If staff members intercede to block the grabbing, he becomes aggressive. Hypothesis: Tangible reinforcement (the pens). Treatment: Functional communication.</p>

The particulars of each problem situation (Table 2) were examined and used to formulate hypotheses concerning the variables thought to maintain problem behavior in each case. The hypotheses, in turn, were used to select specific treatment procedures. Our treatment approach therefore conformed to the hypothesis-driven model articulated by Repp, Felce,

and Barton (1988) and Repp and Karsh (1990). Hypotheses concerning the maintaining variables for problem behavior fell into two categories: escape from putative aversive stimuli, such as task demands and prompts, and tangible reinforcement involving specific grocery store items. These categories corroborated the hypotheses offered by the staff during the interview process described earlier.

Implementation of choice procedures provides the first example of how hypothesis generation was linked to treatment. Consider the first problem situation for Mark listed in Table 2 (aggression when prevented from leaving the store). The store was closely associated with a variety of shopping tasks that regularly evoked noncompliance and other behavior difficulties. Therefore, it was hypothesized that Mark's problem behavior was maintained by escape from the conditioned aversive properties of store stimuli that had become discriminative for forthcoming demands. A procedure was needed to induce him to remain in the store, become engaged in store-related activities, and to do so without exhibiting problem behavior. Allowing individuals to choose activities and reinforcers can produce appropriate engagement with the social and work environment while minimizing disruptive avoidance behaviors (Dunlap, Dunlap, Clarke, & Robbins, 1991; Dyer, Dunlap, & Winterling, 1990; Koegel, Dyer, & Bell, 1987; Parsons, Reid, Reynolds, & Bumgarner, 1990). Therefore, Mark was given choices. Specifically, prior to entering the store, he was asked what he would like to do first after he entered the store. If he failed to choose an activity within 5 s, he was offered a number of options that had been identified from past shopping expeditions. For example, if he had been observed to spend some time examining pens and pencils, magazines, and reading labels off various boxes, he would be asked, "Mark, when we go into the store, would you like to look at the pens and pencils, magazines, or read labels?" After he indicated his choice, staff would accompany him directly to the relevant area of the store and allow him to engage in his chosen activity for 2 to 3 min. The same procedure was in effect for Bob's first problem situation (Table 2).

In several problem situations, choice was combined with a second procedure, embedding. For example, because Mark purchased a preferred item from his shopping list (e.g., potato chips) without incident and was aggressive when asked to purchase a nonpreferred item (e.g., soap), we hypothesized that aggression in Mark's second problem situation was maintained by escape from the demands of purchasing nonpreferred items. A procedure was needed to preempt any emergent problem behavior as well as to induce compliance with the shopping task. A group of procedures variously referred to as interspersal training (Horner, Day, Sprague, O'Brien, & Heathfield, 1991), high-probability request sequences (Mace et al., 1988), pretask requesting (Singer, Singer, & Horner, 1987), task variation (Dunlap, 1984; Dunlap & Koegel, 1980; Winterling, Dunlap, & O'Neill, 1987), and embedding (Carr, Newsom, & Binkoff, 1976) can enhance compliance while minimizing disruptive behavior. The essence of these procedures is to present the problematic task within the context of stimuli known to be discriminative for nonproblem behavior. In the present case, asking Mark to purchase a nonpreferred item (e.g., soap) constituted the problematic task, and providing Mark with an opportunity to engage in (choose) preferred activities constituted the discriminative stimulus for nonproblem behavior. Therefore, Mark was allowed to choose among several preferred activities identified from past shopping expeditions. Once he made a choice, he was allowed to pursue the activity for 1 to 2 min. The procedure was repeated once. Mark was then asked to get the nonpreferred item. That is, the task that had evoked problem behavior was presented within the context of a series of preferred activities chosen by Mark. The combination of choice and embedding was also used in the second, fourth, and fifth problem situations for Bob as well as the second and fourth problem situations for Danny. In several of these situations, gestural and physical prompts (rather than simple requests to purchase a nonpreferred item) were the discriminative stimuli for problem behavior.

For all residents, the procedures just described were in effect during the first session of treatment.

Thereafter, in the interest of efficiency, an attempt was made to decrease the number of times that the choice and embedding procedures were employed. Beginning with the second treatment session, choice and embedding were reintroduced only if a resident displayed an instance of tolerated problem behavior in response to a demand to purchase a nonpreferred item. If the resident responded to the demand without displaying problem behavior, the choice and embedding procedures were not used, and the shopping expedition proceeded to the next step of the task sequence.

Choice was also used in situations in which it appeared that problem behavior was maintained by acquisition of tangible items (as opposed to escape from demands or prompts). For example, when Mark was blocked from obtaining a prohibited snack item, he responded aggressively (third problem situation, Table 2). In such situations, one strategy is to permit the individual to choose substitute items that approximate the target of the request (Durand, 1991). Thus, Mark was given an opportunity to choose among several brands of low-salt pretzels, potato chips, or corn chips. The same strategy was employed to deal with situations in which problem behavior was evoked when Mark was asked to terminate an activity involving a preferred item. In this case, Mark was allowed to choose an alternative preferred activity and engage in it for 1 to 2 min, after which the shopping expedition continued.

Functional communication training constituted a third procedure and was used in the fourth problem situation for Mark (Table 2). It was hypothesized that problem behavior in this situation was maintained by the tangible reinforcement that was received as a consequence of aggression. Research has demonstrated that teaching communicative behaviors that are functionally equivalent to the problem behavior (e.g., obtaining the item by saying, "I want the cookies," rather than by aggressing) can result in reductions in problem behavior (Bird, Dore, Moniz, & Robinson, 1989; Carr & Durand, 1985; Day, Rea, Schussler, Larsen, & Johnson, 1988; Horner & Budd, 1985). Accordingly, in the first treatment session, each time Mark approached

an area of the store in which one of the target items (crackers, cookies, potato chips, or soup) was located, a staff person prompted a request (e.g., "Mark, if you want the crackers, say 'I'd like some crackers, please'"). When Mark repeated the prompted statement, he was allowed to have a portion of the reinforcer (e.g., one or two cookies) and the open package was placed in the shopping cart for subsequent purchase. In the case of the soup, the unopened package was placed in the cart for consumption upon arrival at home. In the second treatment session, when Mark approached within 1 m of a preferred item, the staff person waited 3 s for him to make a request, after which a request was prompted. After the second treatment session, if Mark did not make a request as he approached one of the items, he was allowed to walk by the item and continue shopping. A request was followed by presentation of the item. This procedure was also used with Bob in his third problem situation (Table 2), except that time delay was not introduced until the third treatment session, and prompts were not discontinued until the fifth treatment session.

For Danny (first and third problem situations), a slight variant of this procedure was used. Specifically, when he grabbed an item (invariably, either a can of soda or a box of cookies) from another customer, he was prompted to return it to the person and then to make a request to the staff member (e.g., "Danny, you can't take things from other people. Ask when you want something. Say, 'I want some soda'"). He was then taken to the area of the store where, for example, the soda was kept. The remainder of the procedure was the same as that used for Mark, except that delay was not introduced until the third treatment session, and prompts were not dropped until the sixth treatment session. Another variant of the procedure was used in the sixth problem situation for Danny. When he grabbed a pen from the cashier's area, he was prompted to return it to the cashier immediately. Then, he was told, "Danny, you can't grab things without asking. Say, 'May I borrow your pen?'" Following the request, the cashier provided the pen and the staff person told Danny to cross off all the

items on his shopping list, a strategy designed to engage him in a socially appropriate behavior.

Building tolerance for delay of reinforcement was the fourth procedure in the multicomponent treatment approach. This procedure was added to functional communication training once the resident was independently requesting preferred items. Pilot observations showed that, in Mark's fourth problem situation, he requested one preferred item after another, thereby never accomplishing any grocery shopping. To remedy this problem, we implemented a procedure in which a request (e.g., "I want the cookies") was followed by a shopping demand (e.g., "Sure, Mark, you can have the box of cookies but first, let's get one of the things on our shopping list and then we'll come back"). Mark was then accompanied to the area of the store where the item on the shopping list was located. Once he had placed that item in the basket, he was permitted to return to the cookie area and obtain the item requested. The time that it took Mark to get the item on the shopping list constituted a delay between his initial request (e.g., for the cookies) and delivery of the requested item. In the first session that delay of reinforcement was put into effect, the delay was programmed by asking Mark to get only one item from his shopping list. By the next session, the delay involved having Mark get two items and, for all subsequent sessions, three items. In this manner, delay of reinforcement gradually increased over time, as was (implicitly) the response requirement for reinforcement. This procedure was also in effect in Bob's third problem situation and in Danny's first and third problem situations.

Presenting stimuli discriminative for nonproblem behavior was the fifth procedure used in the multicomponent treatment approach. Consider the sixth problem situation for Mark. When asked to wait in line behind other customers at the checkout stand, he would often become agitated after 1 to 2 min. If he were then prevented from leaving, he would strike out at the staff person or nearby customers. It was hypothesized that problem behavior in this situation was maintained by a history of

negative reinforcement for aggression through escape from having to wait in line. A procedure was needed that would result in waiting without accompanying aggression. It is sometimes possible to introduce stimuli that are discriminative for nonproblem behavior in otherwise problematic situations; by doing so, one can prevent the emergence of problem behavior (Touchette, MacDonald, & Langer, 1985). By restructuring their clinical situation so that new environmental conditions predominated, Touchette et al. were able to prevent problem behavior from recurring. In parallel fashion, we noted that Mark never exhibited problem behavior while reading magazines (one of his favorite activities). Therefore, as we approached the checkout stand, we prompted Mark to take a magazine from the nearby rack and read it. Prompts were discontinued after two sessions. The magazine was discriminative for nonproblem behavior (reading). This procedure was applied with a different discriminative stimulus for nonproblem behavior in Bob's sixth problem situation and Danny's fifth problem situation. Specifically, they were allowed to consume a preferred item that they had purchased (e.g., potato chips or cookies). Bob and Danny had never displayed problem behavior while eating potato chips or cookies; thus, these activities were clearly discriminative for nonproblem behavior.

Treatment was terminated after each resident had completed 90% or more of the steps in the shopping sequence without displaying criterion levels of problem behavior for four consecutive sessions. At this point, the maintenance phase of the study began.

*Maintenance.* Maintenance sessions were conducted using the same procedures described for baseline. However, staff members implemented the treatment procedures independently with no further training, prompts, or feedback from the authors. To demonstrate the durability of treatment effects, the residents participated in a large number of maintenance sessions (35, 30, and 25 sessions for Mark, Bob, and Danny, respectively). Once maintenance effects were demonstrated, the number of



Table 3  
Social Validity Data for Group-Home Staff

Rater	Mark		Bob		Danny	
	Pre	Post	Pre	Post	Pre	Post
1. I am afraid to take this resident shopping.						
1	5	1	6	1	4	1
2	3	1	2	1	4	1
3	7	1	5	1	4	1
<i>M</i>	5.0	1.0	4.3	1.0	4.0	1.0
2. I feel confident that I can control him in the store.						
1	2	6	7	7	3	6
2	3	7	3	7	4	6
3	3	7	5	6	3	7
<i>M</i>	2.6	6.6	5.0	6.6	3.3	6.3
3. This resident's problem behavior in the store is very severe.						
1	4	1	5	1	5	2
2	5	1	4	1	2	1
3	5	3	4	2	4	1
<i>M</i>	4.6	1.6	4.3	1.3	3.6	1.3

*Note.* Each question was rated on a 7-point scale, with 7 representing "very much/always," 4 representing "somewhat/sometimes," and 1 representing "not at all/never."

items on the shopping list was increased from three to five for three sessions, then from five to seven for three more sessions, and, finally, from 7 to 10 for a varying number of sessions for each resident.

**Social validity.** The three staff members from each resident's group home were asked to fill out a three-item 7-point Likert-type questionnaire (Table 3) at the end of the baseline and maintenance phases. In addition, for each resident, the three cashiers who were present during the greatest number of sessions were selected to fill out a two-item 7-point Likert-type questionnaire (Table 4). Because the residents had almost no contact with the cashiers during baseline (i.e., residents' problem behavior invariably resulted in their having to be escorted out of the store prior to completion of the shopping expedition), ratings were made at the end of the maintenance phase only. Therefore, the ratings of the cashiers (in contrast to those of the staff members) were valuable only as a measure of post-treatment impact and social acceptability rather than as a measure of behavior change per se. Nonetheless, validation of treatment outcome by members

Table 4  
Social Validity Data for Supermarket Cashiers

Cashier	Mark	Bob	Danny
1. I am frightened by this person's behavior.			
1	1	1	1
2	1	1	1
3	4	1	1
<i>M</i>	2	1	1
2. It is all right for this person to shop in the supermarket.			
1	7	7	7
2	7	4	7
3	4	7	7
<i>M</i>	6	6	7

*Note.* Each question was rated on a 7-point scale (see Table 3).

of the community is an important ancillary index of intervention efficacy.

#### *Response Recording and Interobserver Agreement*

Two dependent variables were recorded: percentage of task steps completed and latency. Percentage of task steps completed was defined as the number of task steps performed correctly before session termination (due to problem behavior or successful completion of the shopping expedition) divided by the total number of steps in the shopping sequence, multiplied by 100%. The total number of steps in the shopping sequence varied from 12 (reflecting the three-item shopping list used in the initial phase of maintenance) to 19 (reflecting the 10-item shopping list used at the end of the maintenance phase). The definition of correct performance on each task step is given in Table 1. Latency was defined as the number of minutes that elapsed between the resident's exiting from the car in the parking lot at the beginning of the shopping sequence to (a) the first instance of untolerated problem behavior, (b) the final (third) instance of tolerated problem behavior, or (c) the successful completion of the shopping task sequence. In addition, the number of tolerated problem behaviors in sessions that were not terminated (i.e., less than three tolerated problem behaviors per session) was tallied to provide an index of the frequency of these

behaviors during successfully completed shopping expeditions. Finally, the percentage of steps prompted by staff was an ancillary measure that was recorded to provide an index of task mastery.

The second author served as the primary observer, and an undergraduate with extensive employment experience in the field of developmental disabilities served as the reliability observer. The two observers positioned themselves 0.91 m to 9.10 m from the resident as the resident moved through the store. Each observer held a stopwatch in the palm of his or her hand and recorded on a small index card that listed the task steps as well as a code that indicated whether or not the task was prompted.

Interobserver agreement was assessed throughout the study on 48%, 49%, and 41% of the sessions for Mark, Bob, and Danny, respectively. A binary reliability index was used for latency, percentage of steps completed, frequency of tolerated problem behavior in successfully completed sessions, and percentage of steps prompted; that is, for each session, reliability was scored as either perfect or no agreement. Agreements for the respective measures were defined as a difference of 5 s or less for latency, the same number of tolerated behaviors (either zero, one, or two), and the same number of steps. For percentage of steps prompted, if the two observers listed a prompt on each of the same steps, perfect agreement was scored. The percentage of sessions with perfect agreement was between 92% and 100% for each measure for each of the 3 residents.

### *Experimental Design*

The multicomponent treatment intervention was introduced in a multiple baseline design across subjects.

## RESULTS

Figure 1 shows the percentage of steps completed and the latency to problem behavior requiring session termination or the latency to successful completion of the shopping expedition for the 3 residents during the baseline, treatment, and

maintenance phases of the study. All residents displayed an increase in the percentage of steps completed from baseline through treatment to initial maintenance (those sessions in which the shopping list consisted of three items) and again in extended maintenance (those sessions in which the shopping list was gradually extended to 5, 7, and then 10 items). Mark reached the criterion for ending the treatment phase (90% or more steps completed for four consecutive sessions) in five sessions; Bob required nine sessions, and Danny required 11. The total training time required to reach criterion was 58 min for Mark, 80 min for Bob, and 96 min for Danny. The mean percentage of steps completed by Mark increased from a baseline level of 30.4% (range, 8.3% to 50%), to an initial maintenance level of 100%, and then to an extended maintenance level of 96% (range, 53% to 100%). The mean percentage of steps completed by Bob increased from 47.3% (range, 8.3% to 100%) in baseline, to 99.7% (range, 91.7% to 100%) in initial maintenance, to 100% in extended maintenance. The mean percentage of steps completed by Danny increased from 20.9% (range, 8.3% to 100%) in baseline, to 89% (range, 33.3% to 100%) in initial maintenance, to 100% in extended maintenance.

The mean latency to behavior problems and the mean latency to completion of shopping without the need to terminate due to problem behavior increased following treatment. The overall mean latency for Mark was 3 min 32 s (range, 7 s to 7 min 6 s) in baseline, 11 min 40 s (range, 9 min 5 s to 13 min 51 s) in treatment, 11 min 23 s (range, 6 min 5 s to 16 min 35 s) in initial maintenance, and 16 min 50 s (range, 10 min 31 s to 31 min) in extended maintenance. The mean latency for Bob was 4 min 5 s (range, 2 s to 9 min 47 s) in baseline, 9 min 11 s (range, 4 min 5 s to 15 min 10 s) in treatment, 9 min 10 s (range, 5 min 27 s to 14 min 42 s) in initial maintenance, and 14 min 25 s (range, 8 min 17 s to 20 min 25 s) in extended maintenance. The mean latency for Danny was 1 min 37 s (range, 8 s to 9 min 6 s) in baseline, 9 min 44 s (range, 2 min 37 s to 12 min 22 s) in treatment, 10 min 26 s (range, 4

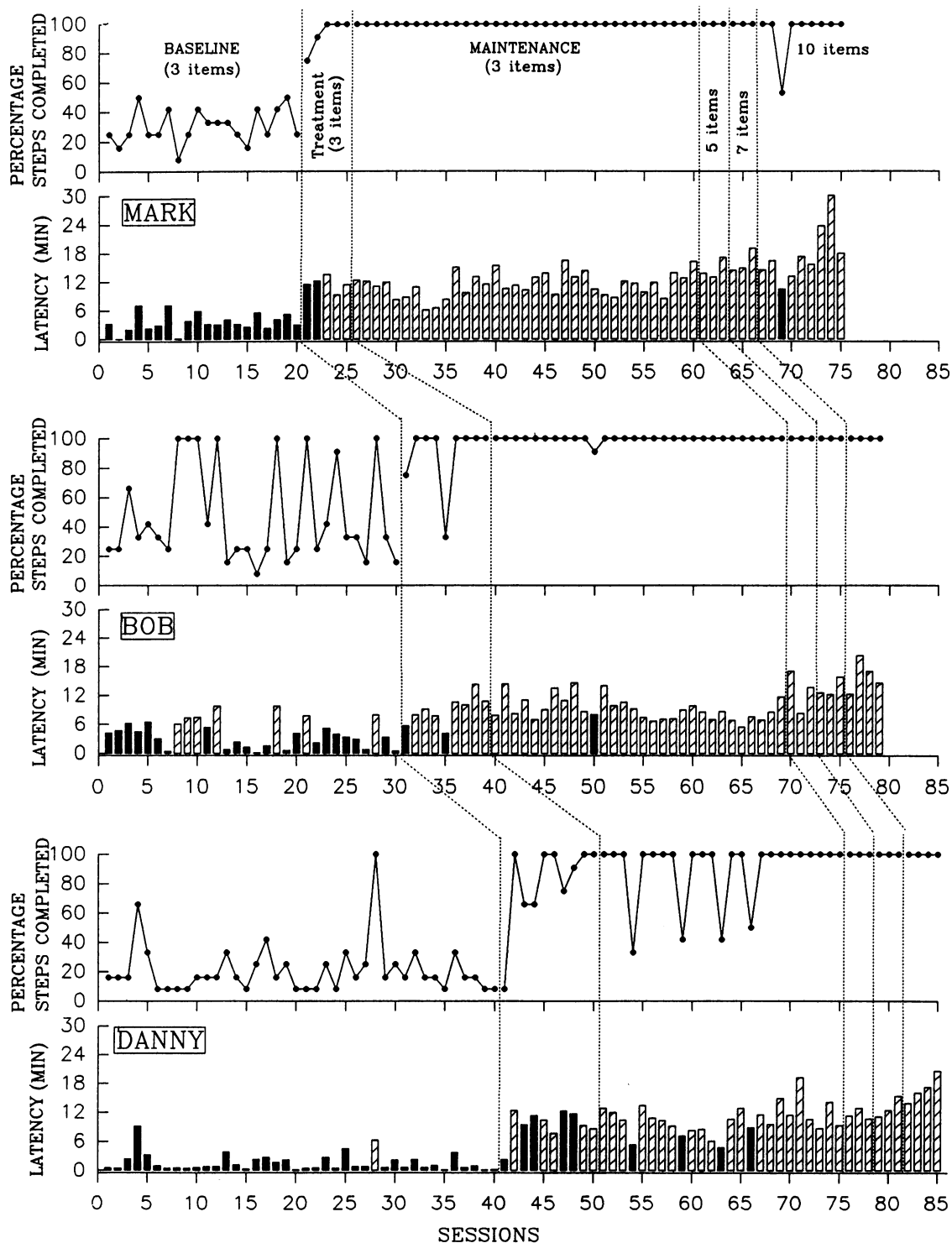


Figure 1. Percentage of steps completed and latency to problem behavior or successful completion of shopping for the 3 residents during the baseline, treatment, and maintenance phases of the study. The solid histograms denote those sessions terminated due to problem behavior, and the diagonal histograms denote those sessions in which shopping was successfully completed without the need to terminate due to problem behavior. The item labels (3, 5, 7, and 10) denote the gradual increase in the length of the shopping list from treatment and initial maintenance to the end of extended maintenance. The abscissa for latency is slightly recessed in order to make short sessions more visible.

min 49 s to 19 min 14 s) in initial maintenance, and 14 min 8 s (range, 10 min 40 s to 20 min 36 s) in extended maintenance. It is clear from the number of solid histograms in Figure 1 that unacceptable levels of problem behavior resulted in few completed baseline sessions. In contrast, in initial and extended maintenance, sessions were almost always completed without the need for session termination due to problem behavior.

The data also show that tolerated problem behavior in sessions that were not terminated was extremely rare following treatment. Mark displayed a mean of 0.09 tolerated problem behaviors per session in initial maintenance and none in extended maintenance. Similarly, Bob displayed a mean of 0.3 in initial maintenance and 0.2 in extended maintenance. Danny displayed a mean of 0.08 in initial maintenance and 0.02 in extended maintenance. The percentage of successfully completed sessions in which there were no tolerated problem behaviors was 94.3%, 79.3%, and 90.5% for Mark, Bob, and Danny, respectively, during initial maintenance, and 100%, 90%, and 90% for Mark, Bob, and Danny, respectively, during extended maintenance.

The level of prompting during the last four sessions of baseline, treatment, initial maintenance, and extended maintenance was compared. For each resident, there was a consistent pattern of increasing independence from prompts as the study progressed. The level of prompts needed during baseline, treatment, initial maintenance, and extended maintenance, respectively, was 52.1% (range, 50% to 58.3%), 35.4% (range, 25% to 41.6%), 12.5% (range, 0% to 25%), and 3.8% (range, 0% to 10.5%) for Mark; 83.3% (range, 75% to 91.7%), 45.3% (range, 41.6% to 50%), 12.5% (range, 0% to 25%), and 6.6% (range, 0% to 15.8%) for Bob; and 100%, 70.8% (range, 50% to 83.3%), 68.8% (range, 58.3% to 75%), and 24.9% (range, 0% to 36.8%) for Danny.

The social validity outcomes reported in Table 3 corroborate the data reported in Figure 1. Prior to treatment, staff members reported, on average, that they were moderately afraid to take the residents shopping, they had low to moderate levels

of confidence that they could manage a resident in the store, and that the residents' problem behavior in the store was very severe. By the end of maintenance, they reported little or no fear of taking the residents shopping, high levels of confidence, and that problem behavior was almost never severe.

The posttreatment reports of the supermarket cashiers (Table 4) provided another measure of social validity. The cashiers noted, on average, little or no fear of the residents' behavior and strongly agreed that it was all right for the residents to shop in the supermarket.

## DISCUSSION

Following a multicomponent treatment intervention, all 3 residents were able to complete a shopping expedition in the community with virtually no problem behavior. These positive results were achieved after a short period of training that varied from approximately 1 hr to 1.5 hr for each resident. The two dependent measures used to monitor progress (percentage of steps completed and latency) proved to be sensitive, stable indicators of intervention efficacy and changed lawfully as a function of treatment conditions. The positive outcomes reported in Figure 1 were further corroborated by the social validity data shown in Tables 3 and 4. Specifically, by the end of the study, the group-home staff members and the supermarket cashiers reported almost no fear of the residents' behavior, considerable confidence in being able to deal with any behavior difficulties (staff data), a perception that problem behavior was no longer severe (staff data), and full acceptance of the residents as supermarket patrons (cashiers' data).

The focus of the present study was on producing a desirable treatment outcome (i.e., completion of shopping without significant problem behavior) rather than on determining which elements of the multicomponent intervention were necessary and which were not. It may be that some other combination of treatments would have been equally (or more) efficacious. For present purposes, however, it is sufficient to note that the package did produce a positive outcome, that each element of the pack-

age had an empirical or clinical basis as reported in the published literature, and that each element was logically linked to the hypothesis-driven strategy articulated in Table 2.

Although a given hypothesis could lead to more than one plausible treatment, the number of plausible treatments is not without limits. Thus, if a tangible reinforcement hypothesis is posited, then communication training would focus on teaching the individual to request a specific item. Teaching the individual to request a break or social contact would not be plausible treatments in this case. Second, treatment selection depends not only on a recognition of the maintaining reinforcers but also on the specific details of the context in which the problem behavior occurs and the practical constraints under which the treatment agent must operate. Thus, in the first problem situation described for Mark (escape from the store), escape communication training was a plausible treatment but was not a practical one. If staff had taught Mark to request leaving the store, he would surely have mastered the skill; however, no shopping would have occurred. If staff had told Mark that they would honor his request but only after some shopping was accomplished, he would have aggressed toward the staff or other customers. Choice of initial activity was deemed the more practical intervention because it resulted in Mark's immediate engagement in nonproblem behavior in the context of store-related activities, thereby paving the way for the continuation of the shopping expedition. In sum, as noted earlier, the systematic delineation of decision rules for intervention selection in real-life contexts is an empirical question that rests on comparative treatment analyses as well as on practical considerations that are dictated by the specific details of the identified problem situation. Ultimately, general decision rules must be abstracted from programmatic research efforts rather than *a priori* assumptions made in individual studies.

The major goal of the present study, fully achieved, was to get residents who had been completely excluded from shopping in the community to be able to complete a supermarket expedition without exhibiting the severe problem behavior that

had led to their exclusion in the first place. In contrast, as noted earlier, the major goal of previous studies was the development of independent shopping skills (Aeschleman & Schladenhauffen, 1984; Gaule et al., 1985; McDonnell, 1987; Wheeler et al., 1980). Because the participants in these earlier studies exhibited few, if any, problem behaviors, remediation was not required, and the interventions emphasized the teaching of specific shopping skills that were eventually displayed independently of staff support. Notwithstanding the need, in the present study, to focus on the remediation of severe problem behaviors as a first priority, we were able to demonstrate, as the study progressed from baseline through maintenance, a replicable pattern of increasing independence from prompts (i.e., decreasing use of corrective feedback, gestures, and physical assistance). The rapid acquisition of the task components suggests that the individuals already had most of the skills in their repertoires and that problem behavior functioned to interfere with the performance of those skills. If so, then the focus on reduction of problem behavior was especially appropriate. Indeed, by the end of the study, the shopping behavior of the 3 residents was primarily under the control of natural nonverbal and verbal cues that the staff members used routinely with the nonproblem residents with whom they went shopping.

Research in the community poses certain measurement challenges not typically found in more controlled environments. Laboratory analogue situations as well as more private settings (such as the home) permit the use of extensive videotaping and consequently the ability to record and evaluate large numbers of dependent and independent variables. In contrast, in a public setting such as a supermarket, our experience has been that the use of videorecorders is embarrassing for the staff, socially stigmatizing for the residents, and intrusive with respect to other store patrons who implicitly are expected to avoid blocking the camera view. Thus, we had to make strategic decisions concerning which variables were most worth recording, because it was not feasible to evaluate large numbers of measures through direct observation. Our decision

to limit recording to steps completed, latency, and amount of prompting was justified by the fact that these variables proved sensitive to the intervention procedures and were associated with acceptable levels of interobserver agreement.

Research in the community poses assessment challenges not typically found in more controlled settings. Optimally, one should begin an intervention by first carrying out a thorough functional analysis and then using the results of this analysis to guide treatment selection (Bailey & Pyles, 1989; Carr, Robinson, & Palumbo, 1990; Durand & Crimmins, 1988; Foxx, 1990; Iwata, Dorsey, Sliker, Bauman, & Richman, 1982; O'Neill, Horner, Albin, Storey, & Sprague, 1990; Wacker et al., 1990). However, in community settings, problem behaviors are frequently determined by multiple variables (Wacker, Northup, & Kelly, in press), thereby making multiple assessments necessary. In the present study, for instance, we identified 18 situations (Table 2) that were correlated with problem behavior. The cost of carrying out 18 separate functional analyses would have been prohibitive in terms of time and personnel. More seriously, carrying out multiple functional analyses in the store environment itself was impractical because of the resulting disruption and our likely expulsion from the store by supermarket management. In light of these difficulties, we opted for an hypothesis-driven model (Repp et al., 1988). Of course, this model was viable only because of extensive prior functional analyses carried out by many investigators over the years (see Carr, Robinson, Taylor, & Carlson, 1990, for a summary). That is, an hypothesis-driven model is not a substitute for functional analysis; rather, it is dependent upon a history of such analyses. Clinicians familiar with this research literature are probably more likely to deduce the same hypotheses compared to those not familiar with the literature. Thus, formal education in applied behavior analysis is a probable prerequisite for replicating the hypothesis-generation procedures that we have described. Hypothesis generation was also aided by two other factors. First, initial interviews with staff members conducted prior to baseline focused our attention on escape and tangible reinforcement as

likely maintaining variables. Second, the level of specificity in the description of the problem situation was important in formulating hypotheses. The use of multiple sources of input (i.e., staff interviews and direct baseline observation) as well as provision of specific details in the baseline description are major factors that can facilitate the replicability of hypothesis generation.

The boundary conditions and pertinent parameters for successful treatment in the community have yet to be fully articulated in the research literature. The present study makes clear, however, that a multicomponent treatment intervention for severe problem behavior can be effective across a range of situations commonly found in a public setting. Further, one need not eschew such investigations because of the impracticality of carrying out multiple functional analyses. An hypothesis-driven model may be a useful alternative. It is also important to note that the limitations of traditional frequency and time-sampling measurement in public places need not deter researchers from carrying out interventions in these settings. Latency and task completion measures can be sensitive indicators of behavior change. The use of these measures keeps public embarrassment and disruption to a minimum. Therefore, the assessment and intervention model delineated in the present study may also be beneficial in dealing with severe problem behaviors in a variety of other public settings, such as restaurants, movie theaters, and shopping malls. By extending applied behavior analysis of problem behavior into these settings, we may be able to enhance the quality of living for people whose opportunities for community involvement would otherwise be severely limited.

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Received April 30, 1992

Initial editorial decision June 30, 1992

Revision received January 4, 1993

Final acceptance January 28, 1993

Action Editor, Robert Horner